

COMMONWEALTH OF VIRGINIA

Green Infrastructure GIS

Green Infrastructure Advisory Workgroup

Technical Findings Report

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Green Infrastructure GIS

Year 1 Final Report Addendum

Green Infrastructure Advisory Workgroup Technical

Findings Report

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EXECUTIVE SUMMARY

The Department of Conservation and Recreation Division of Natural Heritage (DCR – DNH), in conjunction with the Virginia Coastal Zone Management Program (VA-CZM), the Virginia Land Conservation Foundation, and the Virginia Commonwealth University Center for Environmental Studies have undertaken a project to:

- Expand upon the Virginia Conservation Lands Needs Assessment (VCLNA) by the development of a Green Infrastructure GIS model for the Coastal Zone and eventually the State of Virginia.
- Develop and assemble GIS datasets for the VA CZM Program's Coastal Geospatial and Educational Mapping System (Coastal GEMS). Coastal GEMS will integrate and provide access to both blue infrastructure (water-based resources out to the 3 mile territorial sea boundary) and green infrastructure maps, data and information on regulations and resource values.

Green Infrastructure has been defined as: “an interconnected network of waterways, wetlands, woodlands, wildlife habitats, and other natural areas; greenways, parks and other conservation lands; working farms, ranches and forests; and wilderness and other open spaces that support native species, maintain natural ecological processes, sustain air and water resources and contribute to the health and quality of life for America's communities and people” (<http://www.asu.edu/caed/proceedings00/EUGSTER/eugster.htm>).

DCR-DNH has made strides in recent years in the development of the main ecological component of the VCLNA with the completion of the Coastal Zone Natural Landscape Assessment (VANLA). The VANLA is currently being expanded to the state and is a landscape-scale GIS analysis for identifying, prioritizing, and linking natural habitats in Virginia. Although the VANLA provides a good starting point identifying “green infrastructure”, there are additional components to consider for a more comprehensive Green Infrastructure GIS model in Virginia. DCR-DNH is expanding the VCLNA to include data for cultural and historic resources, prime agricultural soils, outdoor recreation, watershed and water quality protection, population growth, and sustainable forestry using the Chesapeake Bay Program's Resource Lands Assessment (RLA) (<http://www.chesapeakebay.net/rla.htm>), as a model template.

The Green Infrastructure Advisory Workgroup (GIAW) was formed as part of the Department of Conservation and Recreation Division of Natural Heritage's FY 04 Task 93.06 Green Infrastructure GIS Grant with the Virginia Coastal Zone Management Program. The GIAW was formed to represent Coastal Partner and statewide interests and expertise in the development of the Coastal Zone and statewide Green Infrastructure. The GIAW was composed of a variety of experts selected from Federal, State, Local, Private and Academic sectors (see Table 1). The GIAW functioned as an oversight committee and sub-technical committees were developed for each model developed as part of the VCLNA. Information from the GIAW meetings is applied to the VCLNA modeling effort. Detailed descriptions and documentation on the VCLNA, Green Infrastructure GIS and the GIAW are also available at <http://www.dcr.virginia.gov/dnh/vclna.htm>.

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Green Infrastructure Advisory Workgroup Meeting 1

The first GIAW meeting was held on April 5, 2006 and included thirty-three participants (Table 2). The objectives of the first GIAW were:

1. To set the stage for the Workgroup's deliberations by giving an overview of the Virginia Coastal Zone Management mapping Initiative (Coastal GEMS), VCU CES INSTAR, and the Department of Conservation and Recreation Division of Natural Heritage's ongoing project, the Virginia Conservation Lands Needs Assessment (VCLNA) and Green Infrastructure.
2. To gain an understanding of what Green Infrastructure meant to members relative to their specific goals/sectors.
3. To identify the datasets members thought constitute Green Infrastructure via their meaning of Green Infrastructure.
4. To tentatively identify the end products/deliverables that would be most useful to members for statewide and local use.

Green Infrastructure Definitions

Results from the group sessions indicated a consensus among the different sectors that green infrastructure represents a system of open space, forests, and farmlands that are ecologically important and useful in identifying areas that should be taken into consideration for conservation during the planning process. The group results for what green infrastructure meant are:

Group 1 State Agency (DCR, VOF)

Definition/meaning:

1. VCLNA definition is a good definition
2. Identification of Green Infrastructure provides a tool for prioritizing for easements and land protection
3. Locate adjacent easements and protected lands
4. Interconnected network for ecological and quality of life purposes
5. Assist with regional planning efforts
6. Green Infrastructure should/is linked closely with watershed planning and water quality
7. Cost for infrastructure development versus land conservation/protection
8. Link to cost to restore water quality after it is impaired due to development
9. Tie data to air quality analysis
10. Quality of life issues related to Green Infrastructure
11. Future generations
12. Importance of developing a complete outreach education strategy to promote Green Infrastructure planning for use in local governments—private/public partnerships with state, federal, nonprofit

Group 2 State Agency (DOF / DGIF)

Definition/meaning:

1. Recreational aspect of—hunting, fishing, wildlife observation
2. Inserting wildlife action (plan) into this process—wildlife in greatest need for conservation, wetlands important
3. Early successional layer(s)—harvest layers
4. Prioritizing forest conservation/targeting—"ecosystem services," "sustainable forestry" concept
5. Resource improvement projects

Group 3 State Agencies (Transportation / Economic Development)

Definition/meaning:

1. Green Infrastructure: Not grey, sensitive, natural resources that are negatively affected by
2. Sensitive natural resources that need to be considered in the planning/decision making process.
3. What does it mean to our sector? Project funding (dollars) requirements affected, project schedules affected, project scope affected, and project quality affected

Group 4 Academics

Definition/meaning:

1. Status evaluation of the state landscape
2. Conceptual blueprint for action to reach ecological goals

Group 5 Local Gov't

Definition/meaning:

1. Large regional system of natural coverage/open space/farmlands that are ecologically/? economically functioning
2. Trying to keep open spaces contiguous with cluster development
3. Sliding scale definition for rural/urban areas—VCNLA may not be appropriate at the larger scale—may use smaller scale and different purposes
4. In urban areas, reestablishment instead of conservation may be important
5. System that does not directly conflict with economic plan, otherwise won't be implemented

Group 6 NGO's

Definition/meaning:

1. Tool for better informed land use planning
2. Land conservation priorities at parcel level
3. Identify and prioritize conservation value
4. Green and blue should be integrated
5. How local conservation fits into the broader picture
6. Consistent set of standards for conservation

Green Infrastructure Dataset Identification

Members applied their definition in identifying what data layers constitute green infrastructure in the next discussion. The final information was compiled to identify all the data sources listed, and note data layers that were important to more than one sector (see next section, Table 3. Compiled Data Layer Summary).

End Products / Deliverables

For the last objective, members discussed what end products or deliverables would be most effective for their use. Group members provided 96 comments on data deliverables. Results indicated a need for digital and hard copy data, data access and informative deliverables. The detailed list is as follows:

1. VCLNA on CD's referred to the PDC and county levels
2. Instruction manual and training on how to use and why—value to localities
3. Maps and atlas of resources
4. Current plans for VCLNA would be more adequate for our use in semi-rural/rural counties
5. Consolidated economic data
6. A state level, goal-oriented Green Infrastructure plan with qualifications of need for future, evidence of planning with current issues in mind, realistic plan for on-the-ground action
7. A realization that compiling data is not, of itself, an answer!
8. Understanding between the differences of information systems and DSS!
9. Integrated goals—region, state, landscape, local

10. Local units must know their responsibility to meet statewide goals
11. Spatially explicit approaches to meet these goals
12. Increase in coordination in agencies and groups as you move forward with other model development
13. Models should improve in their ability to predict or assess economic valuation of natural resources
14. Models would increase in their utility if they began to assess the issue of resource sustainability
15. Define user audiences
16. Downloadable or on CD or DVD datasets that are integrated and current with a timeline for maintenance and distribution in the future—metadata standards, a conservation lands database, all elements of which fit together seamlessly
17. Comprehensive plans—environmental element, mapping—potential conservation lands, existing conservation lands, critical habitat, natural resources—fish, wetlands, etc.
18. Regional growth analysis—change in impervious surfaces, linking watershed information
19. Recreation planning—water access, trails, parks, open space
20. Water supply plans—DEQ—existing conditions
21. A comprehensive set of well documented data layers that are freely available for download (including model results and base data that were fed into the models)—one-stop shop for data
22. GIS data—for download (or ArcIMS) so it can be used locally not just in a web application
23. Printed maps
24. Written report explaining methodology with emphasis on the ranking system
25. Educational materials designed for local officials (county boards and city councils)
26. Data quality standards—same format
27. Metadata
28. A unified statewide county parcel data layer
29. GIS data use in state level work for use at local/regional levels
30. Statewide GI system that includes natural resources, parks
31. Thematic maps of GI system
32. CD and maybe atlas updated annually
33. I detest ArcIMS because it is way too slow if it works at all! And we have a cable connection!
34. If ArcIMS is used, it should be complete with metadata links from data
35. Prioritization analysis capability with economics
36. I would like a database that is compatible and complete—or, if it is not complete, it should be connected—metadata
37. One-stop shopping
38. We need a river and stream corridor protection plan to address water quality and stormwater issues
39. A plan to guide development so contiguous green areas are left
40. Some ideas for how to link the two great green areas—the Blue Ridge and the Southwest Mountains of our region
41. Further linkage of the linking opportunities in our area
42. Identification of biodiversity hotspots that aren't in the protected areas
43. The most up-to-date data and fine scale land cover possible
44. Easily accessible data all in one “location”
45. Most critical areas of focus for rapidly developing areas
46. What other localities are doing—successes, failures

47. Establish communication network with all groups
48. Data CDs/DVDs
49. Update schedules and notices
50. FTP/data upload sites
51. Centralized data catalogs/websites—i.e., one place to get all Virginia State agency GIS data—currently, many different agencies have different datasets; it's hard to know what is out there and who has it
52. Staff and agency contacts—names, numbers, titles, etc.
53. Connection of visual and cultural assets as part of green infrastructure
54. Means/plan and strategy to promote green infrastructure to local governments
55. Address difficulty of promoting this concept without statewide planning—form a partnership to address this
56. Connect model to quality of life issues
57. Ability to map interconnections for recreation resources on a regional and statewide basis
58. Economic valuation of recreation/open space lands versus development costs for infrastructure (this entry was highlighted)
59. Priority areas for conservation, open space and recreation lands
60. Applicability of model to watershed planning (i.e., if you can't protect a high priority area make stormwater management options more creative using LID techniques)
61. Way to evaluate benefit of ecological function for use in land use planning and development decisions
62. Identifying priorities for natural, cultural resources protection that incorporate vulnerability analysis
63. Statewide landscape assessment, ecological model
64. Recreation model that incorporates trails, greenway, parks, water trails, etc., that can be used to prioritize projects on state level
65. Multi-dimensional tool for land use planning at local and regional level (for application to natural resource, cultural, recreational, etc., decision making)
66. Web services of data to be used for planning—models for GIS planning
67. More communications between interested parties to facilitate sharing
68. Web features—map services (VDOT already has this in place) for all Virginia agencies and data-providing organizations
69. Real-time data exchange from other agencies to VDOT—external portal
70. Consistent data format in updates for compatibility and efficiency
71. Quality data—regular updates—update data schedules
72. Resource location and information and mapping services
73. Management plans for each resource
74. Location of resources improvement or enhancement opportunities
75. Streamline environmental review and clearances
76. Programmatic resource clearances
77. Datasets—early successional habitat, better land cover, spatial dataset of planned land management
78. Better partnerships between state, local, federal, and private conservation organizations
79. List of prioritized conservation data needs
80. A geographic model of natural resource threats
81. Process/format for communicating conservation priorities to localities
82. Validation of products/deliverables is critical to success

83. Tools for re-actionable information—i.e., stream information for kayaking
84. Online accessible public tools that incorporate real estate and developers with “hot spots” and “cares” in an easy to find format
85. Identification of sites suitable for restoration that would add most value to the GIS
86. Map of priority conservation sites
87. Maps of conservation values that need to be protected and considered in management decisions (why should it be protected?)
88. Forestry priority conservation areas
89. Finer scale—urban/suburban data layer
90. Forest areas identified with ecosystem services characterization
91. Green infrastructure should be tied to economic value for the community
92. Data that can be modified with local data to better “fit” the needs of the specific locality
93. One “map” data layer that combines many layers so local officials can have one stop shop for green infrastructure
94. Data in hard and soft copy and internet
95. A data layer of known and potential vernal pools—they have fallen through the net of available information
96. A mapping layer showing older second growth and “mature” forest areas that can specifically be targeted to conserve, protect, and allow old growth development

The information from this meeting was and is used to guide each VCLNA model development research phase.

Green Infrastructure Advisory Workgroup Meeting 2

The second GIAW meeting was held on June 6, 2006 and included twenty-four participants (Table 4). The objectives of the second GIAW were:

1. To share information on different implementation strategies: Coastal GEMS, Heritage Explorer, and NatureServ VISTA
2. To elaborate on GIAW findings related to additional green infrastructure data layers
3. To explore how workgroup members anticipate using green infrastructure data in their decision-making and work

GIAW Data Layer Findings

Members, working in small groups organized by sector, reviewed a handout that had been prepared as the result of the previous planning session. It was organized by topical area and listing under each: data layers, GIS sources and VCLNA Model. Small groups were asked to review the listing and provide additional information on sources of data as well as additional data. Results were compiled and presented to the DEQ-CZM to aid in the Coastal GEMS website project development. Additionally, results are used as part of the VCLNA exploratory effort undertaken at the onset of each model. The information is used to assess data layer inclusion in the VCLNA, the existence of the dataset in GIS and the source of the dataset.

The following pages are the compiled results of this effort. The headings are broken down as:

- *Data type or group*: Ecological/Conservation, Forestry, Land Cover / Base Data, Air, Wildlife / Wildlife Habitat, Aquatic, Cultural, Recreation, Human Population, Economic, Transportation, Local, Federal, Misc.
- *GIS YES* – Source: As far as the group was aware, the source of the dataset if it existed in GIS format was written.
- *GIS NO*: As far as the group was aware, GIS data did not exist.
- *NOTES*: Additional input by the end users.
- *VCLNA Models*: If the data was being used in a VCLNA Model, the specific VCLNA model(s) was noted in the field.

Table 3. Compiled Data Layer Summary

ECOLOGICAL/CONSERVATION	GIS YES - Source	GIS NO	NOTES	<i>VCLNA Models that include noted dataset</i>
Conservation lands	Conservation Lands - DCR DNH			<i>recreation</i>
VOF easement	Conservation Lands - DCR DNH			<i>recreation</i>
Easement data layer (public, private, nonprofit, at all scales)	Conservation Lands - DCR DNH			<i>recreation</i>
Natural heritage sites	DCR DNH			<i>ecological</i>
Wildlife Action Plan		no	Sam Hall says not a GIS layer	<i>ecological</i>
Planned conservation easement lands	VDOF			
Section 6(f) Parks	VDCR, NPS			
Biodiversity	DGIF		VA GAP	
FORESTRY	GIS YES - Source	GIS NO	NOTES	<i>VCLNA Models</i>
Agricultural and forestal districts	DOF			
Forest health (risk)	DOF			
Riparian Forest Buffers	DOF; VIMS - incomplete		Penn State layer, Lower Rappahannock high res, Chesterfield county high res	
Mature/old forest, detailed forest types, forest cover	DGIF; DOF		DOF - 2005 Land Use cover J. Scrivani (30m)	
Maritime Forest			VIMS coming soon	
LAND COVER / BASE DATA	GIS YES - Source	GIS NO	NOTES	<i>VCLNA Models</i>
Detailed land cover, updated land cover data	USGS, RESAC			<i>Vulnerability, Forest Economics, Water Quality, Agriculture, Ecological</i>

Prime farmlands, cultivated farm fields	USDA - SSURGO or STATSGO			<i>Agriculture</i>
Geology	DMME; USGS			<i>Ecological</i>
Hydric soils	USDA NRCS			<i>Water Quality, Agriculture, Ecological</i>
Soils (ssurgo or other detailed)	USDA NRCS			<i>Forest Economics, Water Quality, Agriculture, Ecological</i>
Elevation	NED; VBMP DTM			<i>Vulnerability, Forest Economics, Water Quality, Agriculture, Ecological</i>
AIR	GIS YES - Source	GIS NO	NOTES	<i>VCLNA Models</i>
Air pollution, non-attainment available	DEQ			
WILDLIFE/ WILDLIFE HABITAT	GIS YES - Source	GIS NO	NOTES	<i>VCLNA Models</i>
Heritage elements	DCR DNH			<i>Ecological</i>
T & E species/streams	DCR DNH; DGIF, FWS			<i>Ecological</i>
Essential habitat for species of greatest conservation need	DGIF		From WAP	<i>Ecological, Vulnerability</i>
Waterbird colonies	DGIF, W & M CCB			<i>Ecological</i>
Migration stopover habitat	DCR DNH (included in EO database for Eastern Shore)		DGIF may be able to help	
H definition of “threatened resources”	DCR DNH has H rank of EO's			<i>Ecological</i>
Population status of high priority species	DGIF WAP			
Regional priorities—the eco-regional plans	DGIF WAP			
Endangered species habitat	DGIF			

Invasive species	FIA FROM DOF - invasive trees and understory (5,000 plots) - J. Scrivani			
Wildlife data	DGIF Collections			
Other wildlife habitat data layers			DGIF, dependent on needs	
Minimal sustainable population habitat—common indicators				
Early successional habitats		no		
Federally Designated critical areas	FWS			
AQUATIC	GIS YES - Source	GIS NO	NOTES	VCLNA Models
NWI Data	NWI - USFWS			<i>Water Quality, Ecological</i>
Floodplains	DCR, FEMA			<i>Ecological</i>
RPA's/ RMA/s	DEQ		CBLA?	<i>Forest Economics, Ecological</i>
Dams	DCR; DGIF			<i>Ecological (anadromous fish)</i>
Karst and caves habitat and water quality	DMME, DCR DHN			<i>Water Quality, Ecological</i>
Oyster reefs, oyster grounds	VIMS			
Stream gauges	DEQ; USGS			
Water withdrawals	DEQ, EPA			
Public water	VDH Office of Drinking Water			
Abandoned mines (habitat) water quality	DMME			<i>Water Quality, Ecological</i>
Point sources	DCR Soil & Water Conservation			

S.W.A.P.—VDH data	VDH			
TMDL Mapping	DCR Soil & Water Conservation; DEQ			<i>Water Quality</i>
Condemned shellfish beds	VMRC; NOAA; VDH			
Vernal ponds, pools (2) -- would be nice, but extremely difficult to map -- available only for small areas (e.g. MNBP)				
Water quality sampling trends	DEQ			
Benthic macro invertebrates stream watch	DEQ			
Stormwater data—MS4	DCR; DEQ			
Structures along waterways	DGIF - Dams, Impediments			
Sewered areas			VDH	
Shoreline situation reports			VIMS	
Buffer for blue infrastructure			VIMS	
Fish habitat	DGIF, VCU INSTAR		CBP	
Animal confinement areas	VDH		NRCS	<i>Water Quality</i>
CULTURAL	GIS YES - Source	GIS NO	NOTES	<i>VCLNA Models</i>
Cultural landscape data	Dept of Historic Resources		Piedmont Env Council - has some local data, not statewide	<i>Cultural</i>
Historic data	Dept of Historic Resources			<i>Cultural</i>
Park	DCR DNH Conservation Lands Database			<i>Recreation</i>
Battlefield sites	NOT COMPREHENSIVE - Some DHR; Civil War Sites Advisory Council (under Parks Service)		Piedmont Env Council - has some local data, not statewide	
Cultural resource—archeology, architecture	Dept of Historic Resources			<i>Cultural</i>

RECREATION	GIS YES - Source	GIS NO	NOTES	VCLNA Models
Trails—Appalachian, W&OD, bike & hike, nature (bird), rail trail, water	DCR; NPS, DGIF			<i>Recreation</i>
Thematic trails—birding trails	DGIF; NPS			<i>Recreation</i>
Beaches—public access to shoreline/water access for recreation	DGIF; DCR - John Davy;			
Recreational value	DOF at county level; VA Tourism Corp			<i>Recreation (if available)</i>
Recreational data related population	Census Data			<i>Recreational</i>
Golf Courses/data layer—VFDP	VEDP			
Swimmable, fishable data for contact recreation	DGIF			<i>Recreation</i>
Greenway locations			DCR - Jennifer Wampler	
Scenic/visual—scenic rivers	DCR			
Scenic/visual—scenic byways	VDOT			<i>Recreation</i>
Scenic/visual—viewsheds			Need an end user to identify particular area to generate viewshed for.	
HUMAN POPULATION	GIS YES - Source	GIS NO	NOTES	VCLNA Models
Industrial sites available for development	VEDP			
Impervious surface	RESAC - DCR			<i>Vulnerability</i>
Urban and suburban habitats and other layers (development clusters) (finer scale)	RESAC or VBMP imagery to ID impervious surface data			
Urban and suburban habitats and other layers (development clusters) (finer scale)	Census data US Census			<i>Vulnerability</i>

Urban and suburban habitats and other layers (development clusters) (finer scale)				
ECONOMIC	GIS YES - Source	GIS NO	NOTES	VCLNA Models
Economic data—cost-benefit development versus conservation				
Economic data/property values	Local government			
Economic land valuation	Local government			
Ecological value	DOF County level forest economics; City Green urban tree values? Paul Revell DOF			<i>Forest Economics</i>
Economic value of wetlands				
HUB zones/enterprise zones	VEDP			
TRANSPORTATION	GIS YES - Source	GIS NO	NOTES	VCLNA Models
Transportation plans—VDOT, local	VDOT			
New roads	VDOT or local gov't		Eventually VGIN roads	
Rail	BTS			<i>Recreation, Ecological</i>
Level of service (roads)	VDOT			
LOCAL	GIS YES - Source	GIS NO	NOTES	VCLNA Models
Local parcel data	Individual localities			<i>Vulnerability</i>
Land ownership/large tracts	Individual localities			<i>Forest Economics</i>
Parcel data for modeling—local government development	Individual localities			<i>Vulnerability</i>
Tax map parcel data	Individual localities			<i>Vulnerability</i>
Future land use plans	Individual localities			
Metro area radius	Individual localities; PDCs			
Local important data layers	Individual localities			

Zoning—identifying open, agricultural—local government development	Individual localities			<i>Vulnerability (residential zoned parcels included in prediction model)</i>
Rezoned land	Individual localities			
Historic and planned land management	Individual localities			
AFD's/land use value taxation	DOF			
Land use plan—local, MPO—some available digital	PDC			
Engineered onsite systems				
Population of VA in 2050				
Smart Growth Framework				
Trade-off analysis—use conflict				
Public facilities (utility, water, sewer)	Individual localities			
FEDERAL	GIS YES - Source	GIS NO	NOTES	VCLNA Models
DOD Lands	DOD			
Military Reservations in the United States	ESRI; Census; U.S.DOT; BTS			
Military facilities and buffers				
Historical spill data		no		
Misc				
Superfund Sites	EPA			
Brownfields	EPA			

Use of Data in Decision-Making and Work

Members, working in small groups, discussed how they anticipated using the data in their decision-making and work. Information was then reported and discussed with the entire GIAW. Results were kept in separate group format to identify different end user decision making process and needs. The compiled results follow:

State

Decisions:

1. Interagency coordination/cooperation
2. Target cost share
3. Target technical assistance at the local level (stewardship plans, wildlife management plans)
4. Setting outdoor recreational goals
5. Water quality decisions—conservation links
6. Staffing/service levels

Federal and some State

Decisions:

1. Compensatory mitigation options
2. Secondary impact evaluation
3. Highway corridor proposals
4. Greenways planning/ecological corridors
5. Support NEPA decisions
6. Permitting for site development
7. Marketing Virginia's recreational attractions
8. Species recovery

Local Government

Decisions:

1. Conservation area planning/prioritization
2. Comprehensive plan updates
3. TMDL, regulatory compliance
4. Stormwater management
5. General communication/presentations
6. Recreational planning
7. Economic development planning
8. Save cultural/tourist resources, avoiding sensitive areas

Academic / NGOs

Decisions:

1. Know where sensitive areas are to help make local government codes more ecological—in GIS layers
2. Make state data more available to localities
3. Implement a review process by state and local governments
4. Target sites for restoration

Data Format

End users were asked to detail and discuss VCLNA deliverables based on their decision making processes. Results from the format of data deliverable discussion were combined as the

information had similarities among the different groups and fall within a standard response set (i.e. data format).

Compiled Results

- One clearinghouse location
- Downloadable data FTP site
- Downloadable from web sites
- Map services/FTP
- GIS format:
 - Shapefiles
 - Geodatabases
 - GIS layers not easily available to general public—make available to agencies only
 - GIS data for advocacy and conservation
- Target locations for restoration and conservation—example: Riparian and marshlands
- Model outputs—into new economic models
- Ex-easements
- CDs, DVDs
- Metadata—PDF, word, Excel, PowerPoint
- Summary printed maps for non-GIS users and localities
- User friendly
- Educational component

Green Infrastructure Advisory Workgroup Meeting 3

The third Green Infrastructure Advisory Workgroup meeting was held on December 19, 2006 and included seventeen participants (Table 5). The objectives of GIAW 3 were:

1. To elaborate on the GIAW findings from the previous meetings and give an update on the current state of the VCLNA.
2. To introduce existing green infrastructure / conservation projects including an overview / update of DEQ CZM Coastal GEMS, DCR's VA Outdoor Plan Green Infrastructure Element, DGIF's Wildlife Action Strategy DGIF, and HRPDC Hampton Roads Conservation Corridor Study.
3. To discuss opportunities / facilitation of continued dialog and collaboration on conservation and green infrastructure related issues.

Green Infrastructure / Land Conservation Collaboration

The workgroup was broken into three working groups to discuss ways to continue the discussion and collaboration of green infrastructure or conservation oriented initiatives. The three groups reported out their results as follows:

Group 1

- Make sure presentations on the topic are being given at conferences such as:
 - Environment Virginia Conference
 - VAPA
 - VACO
- Form a council or leadership group based on Invasive Species Group
- Provide technical support to localities:
 - Generic help locating information and what is available as a resource to local government
 - Sensitive data information in the form of hard copy maps or models. Many rural localities do not have the resources to support a GIS effort, provide information to these localities to help them make green infrastructure decisions.
 - Design / Mapping
 - Formulate a green infrastructure plan that can be provided to local governments, in particular rural counties that do not have a full planning staff. That information can be implemented at the local government level.
- Need funding at a state level to support these green infrastructure initiatives, funding to support meeting collaboration.
- Education to politicians
- GIAW #4 – Host a 4th meeting to define a GIAW group – the vision, what will the group do, what level will it operate at, etc.

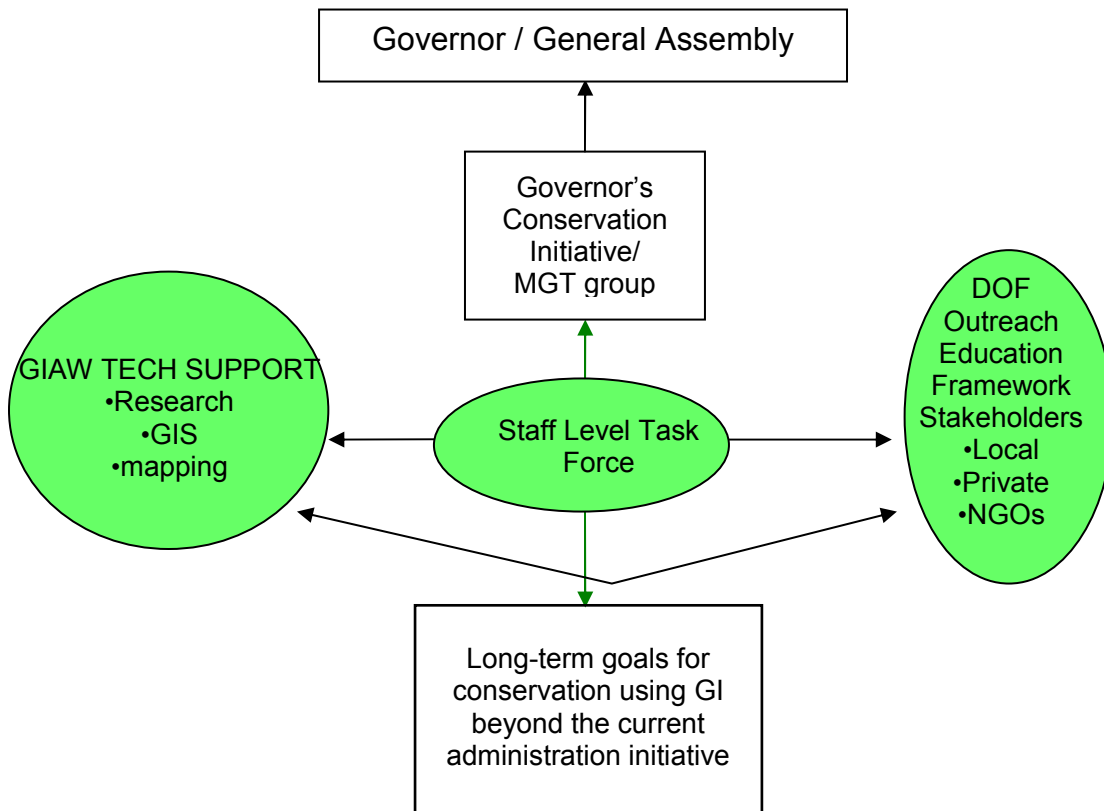
Group 2

- Develop an email list or a Google group to share information about ongoing projects.
- Create a Green Infrastructure BLOG
- Host a Green Infrastructure Summit similar to the Coastal Program summits. Can tie this to the VAPDC GIS Conference or similar conference; or recommend the conferences include Green Infrastructure as session tracks.
- Create GI Workgroups for:
 - Policy / planning
 - Outreach
 - Implementation

- Data
- E-newsletter – such as VA Tech Geospatial Newsletter. Have John McGee use the GIAW working list to contact individuals for articles on conservation projects.
- Grassroots newsletter
- Showcase successes

Group 3

- Create a clearinghouse of information, GIS as well as basic green infrastructure and conservation oriented data / resources. Provide a framework of guidance to GI planning.
- VGIN a potential ally to assist with a statewide clearinghouse for GI GIS (no service fee required though).
- Get funding organizations to support ongoing GI planning (i.e. Foundation for Virginia's Natural Resources).
- Create a green infrastructure network, similar to the Coastal Program Network.
- Need to have a legislated command for the development of a Green Infrastructure workgroup and envision this as a potential example for the workgroup:



There is a need for the creation of a technical task force that operates at a “staff level” that is comprised of GIAW Tech Support staff and outreach staff (third GREEN tier). This group is a technical group similar to the GIAW group and includes groups that support the technical component of green infrastructure planning, as well as an education / implementation group that support the framework needed to educate and implement the green infrastructure plan. This group work towards the long term goals for conservation using green infrastructure.

The staff level task force reports to a management task force. This conservation initiative or management branch (i.e., Invasive Species Council) (second tier) reports to the governor and the general assembly and will operate to ensure that long term green infrastructure goals are being met. This level is a management level, potentially composed of state agency heads, division leaders, and private and academic sector individuals.

The task force would be mandated by the General Assembly and structured so that management acts as an intermediary between the staff level and the Governor or General Assembly level. This will ensure information is appropriately gathered and disseminated, as the staff level task force is comprised of technical, hands-on individuals conducting conservation and GI projects.

The goals of this GIAW or yet named task force will be determined by the group. The vision of the group will have to be determined, an assessment of the current state of green infrastructure must be evaluated, project information compiled, strategic plans and implementation strategy developed.

The GIAW concluded with an agreement among those present that there is a need for a continued dialog among groups to provide an avenue for collaboration and discussion on ongoing efforts. The meetings have shown the group that a variety of efforts are underway, some duplicative in nature, with the same overriding goals and themes. Fragmented approaches to conservation planning can be remedied with collaborative efforts. With continued dialog, we stay informed of other efforts and can create a network to help facilitate coordination, collaboration and effective implementation of green infrastructure into conservation planning.

Table 1. Green Infrastructure Advisory Workgroup Master Invitee List

Green Infrastructure Advisory Committee		
Agency	Contact Name	Email
Federal Agencies		
USFWS	Joe McCauley	FW5RW_EVRNWR@fws.gov
USFWS	Karen Mayne	karen_mayne@fws.gov
USFWS	Mike Drummond	mike_drummond@fws.gov
USGS	John Young	jyoung@usgs.gov
NPS	Ursula Leminski	ursula_lemanski@nps.gov
Chesapeake Bay Program	Peter Clagget	pclagget@Chesapeakebay.net
EPA	Bill Jenkins	Jenkins.Bill@epamail.epa.gov
State Agencies		
DGIF	Dave Morton	Dave.Morton@dgif.virginia.gov
DGIF	Kendell Ryan	Kendell.Ryan@dgif.virginia.gov
DGIF	Becky Gwynn	Becky.Gwynn@dgif.virginia.gov
DGIF	Sam Hall	has subsequently taken a job with VGIN/VITA
DOF	John Scrivani	john.scrivani@dof.virginia.gov
DOF	Lucinda Mallinak	
DOF	Mike Foreman	has subsequently taken a job with DCR
DCR/CBLA	Joan Salvati	joan.salvati@dcr.virginia.gov
DCR	Janit Llewellyn	janit.llewellyn@dcr.virginia.gov
DCR	Rick Hill	rick.hill@dcr.virginia.gov
VEDP	Mary Davis	madavis@yesvirginia.org
VDOT	Ricky Woody	ricky.woody@viriniadot.org
VDOT	Geraldine Jones	Geraldine.Jones@VDOT.Virginia.gov
VDOT	Melanie Seigler	Melanie.Seigler@VDOT.Virginia.gov
VOF	Molly Gerard	mgerard@vofonline.org
VOF	Martha Little	mlittle@vofonline.org
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DCR	Jennifer Ciminelli	jennifer.ciminelli@dcr.virginia.gov
Coastal Program DEQ	Kelly Price	kelly.price@deq.virginia.gov
Coastal Program DEQ	Laura McKay	laura.mckay@deq.virginia.gov
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DCR	Todd Janesky	todd.janesky@dcr.virginia.gov
DCR	Pei-Jen Shaner	has subsequently taken a job with E2

Universities		
VCU	Nicole Davis	wshuart@vcu.edu
VCU	Greg Garman	ggarman@mail2.vcu.edu
VA Tech	Scott Klopfer	sklopfer@vt.edu
VIMS	Marcia Berman	marcia@vims.edu
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UVA	Karen Firehock	kef8w@virginia.edu
PDC		
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MPPDC	Sara Stamp	sstamp@mppdc.com
NVPDC	Laura Grape	lgrape@novaregion.org
Crater PDC	Mark Bittner	mbittner@cpd.state.va.us
RRPDC	Patrick Mauney	plmauney@rrregion.org
NNPDC	Stuart McKenzie	smckenzie@nnpdc17.state.va.us
A-NPDC	Elaine Meil	emeil@a-npdc.org
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Richmond Regional PDC	Sarah Weisiger	SWeisiger@richmondregional.org
Locals		
Richmond County	Chris Jett	cjett@co.richmond.va.us
Stafford County	Kathy Baker	kbaker@co.stafford.va.us
Thomas Jefferson PDC	Rochelle Garwood	rgarwood@tjpd.org
Thomas Jefferson PDC	Harrison Rue	hrue@tjpd.org
NGO's		
Conservation Fund	Ted Weber	tweber@conservationfund.org
Friends of the Dragon Run	Tom Gregory	DragonSwamp2@wmconnect.com
Friends of the Dragon Run	Greg Moser	vtsec11@juno.com
Citizens for a Better Eastern Shore	Denard Spady	cbes@esva.net
The Nature Conservancy	Gwynn Crichton	gccrichton@tnc.org
The Nature Conservancy	Chris Bruce	cbruce@tnc.org
Ches Bay Foundation	Joe Lerch	jlerch@cbf.org
Northern Neck Land Conservancy	Philip Reed	philipreed@earthlink.net
James River Association	Amber Foster	afoster@jamesriverassociation.org
Western VA Land Trust	Roger B. Holnback	rhlnback@westernvirginalandtrust.org
Piedmont Env Council	Mike DeHart	
Piedmont Env Council	Rex Linville	rlinville@pecva.org
E. Shore Land Trust	Pete Henderson	landtrust@earthlink.net
Blue Ridge Conservancy	Susan Cable	blueridgeconserve1@nexet.net

NatureServ	Cindy McKinney	Cindy_McKinney@natureserve.org
NatureServ	Lynn Scharf	lynn_scharf@natureserve.org
	Kim Marbain	
	Watson Randolph	
	Andrew Culbertson	
	Jeff Matthews	

Table 2. GIAW Meeting 1 Attendee List.

Agency	Contact Name	Email
Federal Agencies		
NPS	Ursula Leminski	ursula_lemanski@nps.gov
State Agencies		
DGIF	Dave Morton	Dave.Morton@dgif.virginia.gov
DGIF	Sam Hall	has subsequently taken a job with VGIN/VITA
DOF	John Scrivani	john.scrivani@dof.virginia.gov
DOF	Lucinda Mallinak	
DOF	Mike Foreman	has subsequently taken a job with DCR
DCR	Janit Llewellyn	janit.llewellyn@dcr.virginia.gov
VEDP	Mary Davis	madavis@yesvirginia.org
VDOT	Ricky Woody	ricky.woody@virginiadot.org
VDOT	Geraldine Jones	Geraldine.Jones@VDOT.Virginia.gov
VDOT	Melanie Seigler	Melanie.Seigler@VDOT.Virginia.gov
VOF	Molly Gerard	mgerard@vofonline.org
DCR	Tom Smith	tom.smith@dcr.virginia.gov
DCR	Joseph Weber	joseph.weber@dcr.virginia.gov
DCR	Jennifer Ciminelli	jennifer.ciminelli@dcr.virginia.gov
Coastal Program DEQ	Laura McKay	laura.mckay@deq.virginia.gov
Coastal Program / VIMS	Scott Lerberg	lerbergs@vims.edu
Universities		
VCU	Nicole Davis	wshuart@vcu.edu
VCU	Greg Garman	ggarman@mail2.vcu.edu
VA Tech	Scott Klopfer	sklopfer@vt.edu
VIMS	Marcia Berman	marcia@vims.edu
W&M CCB	Mike Wilson	mdwils@wm.edu
PDC		
HRPDC	Eric Walberg	ewalberg@hrpdc.org
MPPDC	Sara Stamp	sstamp@mppdc.com
Crater PDC	Mark Bittner	mbittner@cpd.state.va.us
NNPDC	Stuart McKenzie	smckenzie@nnpdc17.state.va.us
Richmond Regional PDC	Sarah Weisiger	SWeisiger@richmondregional.org
Locals		
Stafford County	Kathy Baker	kbaker@co.stafford.va.us
Thomas Jefferson PDC	Rochelle Garwood	rgarwood@tjpd.org
NGO's		

Friends of the Dragon Run	Greg Moser	vtsec11@juno.com
The Nature Conservancy	Chris Bruce	cbruce@tnc.org
Blue Ridge Conservancy	Susan Cable	blueridgeconserve1@nexet.net
	Jeff Matthews	

Table 4. GIAW Meeting 2 Attendee List.

Agency	Contact Name	Email
Federal Agencies		
USFWS	Mike Drummond	mike_drummond@fws.gov
NPS	Ursula Leminski	ursula_lemanski@nps.gov
State Agencies		
DGIF	Sam Hall	has subsequently taken a job with VGIN/VITA
DOF	John Scrivani	john.scrivani@dof.virginia.gov
DCR	Janit Llewellyn	janit.llewellyn@dcv.virginia.gov
VEDP	Mary Davis	madavis@yesvirginia.org
VDOT	Ricky Woody	ricky.woody@virginiadot.org
DCR	Joseph Weber	joseph.weber@dcv.virginia.gov
DCR	Jennifer Ciminelli	jennifer.ciminelli@dcv.virginia.gov
Coastal Program / VIMS	Scott Lerberg	lerbergs@vims.edu
DCR	Todd Janeski	todd.janeski@dcv.virginia.gov
DCR	Pei-Jen Shaner	has subsequently taken a job with E2
Universities		
VCU	Nicole Davis	wshuart@vcu.edu
VIMS	Marcia Berman	marcia@vims.edu
PDC		
HRPDC	Eric Walberg	ewalberg@hrpdc.org
MPPDC	Sara Stamp	sstamp@mppdc.com
Crater PDC	Mark Bittner	mbittner@cpd.state.va.us
NGO's		
James River Association	Amber Foster	afoster@jamesriverassociation.org
Piedmont Env Council	Mike DeHart	
NatureServ	Cindy McKinney	Cindy_McKinney@natureserve.org
NatureServ	Lynn Scharf	lynn_scharf@natureserve.org
	Kim Marbain	
	Watson Randolph	
	Andrew Culbertson	

Table 5. GIAW Meeting 3 Attendee List

NAME	ORGANIZATION	EMAIL
Synthia Waymack	DCR	synthia.waymack@dcr.virginia.gov
Lynn Crump	DCR-PRR	lynn.crump@dcr.virginia.gov
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Kendell Ryan	DGIF	kendell.ryan@dgif.virginia.gov
Chris Bruce	TNC	cbruce@tnc.org
Tom Smith	DCR	tom.smith@dcr.virginia.gov
Eric Walberg	HRPDC	ewalberg@hrpdc.org
Joe Weber	DCR	joseph.weber@dcr.virginia.gov
Bob Carter	DHR	bob.carter@dhr.virginia.gov
Lyndsay Duncan	DHR	lyndsay.duncan@dhr.virginia.gov
John Scrivani	DOF	john.scrivani@dof.virginia.gov
Geraldine Jones	VDOT	geraldine.jones@vdot.virginia.gov
Ursula Lemanski	NPS-RRR	ursula_lemanski@nps.gov
Rex Linville	PEC	rlinville@pecva.org
Jennifer Ciminelli	DCR-DNH	jennifer.ciminelli@dcr.virginia.gov

APPENDICES

APPENDIX A. GIAW Meeting 1 Agenda

Agenda
Green Infrastructure Advisory Workgroup Meeting 1
April 5, 2006
10:00 am – 2:00 pm
Virginia Housing Development Authority
601 S. Belvidere Street, Richmond

Objectives

1. To provide an overview of the VA Coastal Zone Management mapping initiative Coastal GEMS, and Natural Heritage's VCLNA.
 2. To gain an understanding of what green infrastructure means to individual members relative to their specific goals/sectors.
 3. What data layers users felt were pertinent to Green Infrastructure Models
 4. What type of data deliverables would support end user needs
-

Introductory Remarks – Orientation to Session

Background Information / Presentations

- Overview – Coastal GEMS – DEQ CZM Laura McKay
- Introduction to Green Infrastructure and the VCLNA – DCR DNH, Joe Weber, Jennifer Ciminelli

Small Group Discussions – Green Infrastructure and Datasets

- What does green infrastructure mean for your sector as it relates to your specific goals?
- What datasets constitute your definition of green infrastructure? Be specific – specific data layers. Note if you are aware of data existence.

End Products and Deliverables

- What products and deliverables would be most beneficial to use statewide or locally?

APPENDIX B. GIAW Meeting 2 Agenda

Agenda

Green Infrastructure Advisory Workgroup

Planning Session #2

Virginia Department of Conservation and Recreation

June 6, 2006, 11:30 AM to 3:30 PM

DEQ Piedmont Regional Office

4949-A Cox Road

Glen Allen, Va. 23060

www.deq.state.va.us/regions/piedmont.html

Lunch (pizza) will be provided

Objectives

1. To share information on different implementation strategies as examples to how green infrastructure can be implemented: Coastal GEMS, Heritage Explorer, and NatureServ VISTA.
2. To elaborate on GIAW findings related to additional green infrastructure data layers.
3. To explore how workgroup members anticipate using green infrastructure data in their decision-making and work.

Introductory Remarks – Orientation to Session (11:30 am – 12:00)

- φ Review – objectives, plan, participation guidelines
- φ Introductions
- φ Pizza provided

Update – Use of Last Session’s Results – Tom Smith, Pei-Jen Shaner, Jennifer Ciminelli (12:00-12:30)

Presentations – Examples of different GIS deliverables (12:30 – 2:15)

- Coastal GEMS – Scott Lerberg and Laura McKay (20 minutes)
- Heritage Explorer – Pei-Jen Shaner (30 minutes)
- NatureServ VISTA – Cindy McKinney (60 minutes)

Small Group Discussions – Elaboration on GIAW data layer findings. How see using Data in Decision-Making and Work. (2:15-3:15)

- φ Small groups report out and discussion

Wrap Up (3:15-3:30)

Close

APPENDIX C. GIAW Meeting 3 Agenda

Agenda

**Green Infrastructure Advisory Workgroup
Planning Session #3
Virginia Department of Conservation and Recreation**

December 19, 2006, 9:30 AM to 1:30 PM

DEQ Piedmont Regional Office

4949-A Cox Road

Glen Allen, Va. 23060

www.deq.state.va.us/regions/piedmont.html

Lunch (pizza) will be provided

Objectives

1. To elaborate on the GIAW findings from the previous meetings.
2. To introduce existing green infrastructure / conservation projects.
3. To discuss opportunities / facilitation of continued dialog and collaboration on conservation and green infrastructure related issues.

Introductory Remarks – Orientation to Session (9:30 am – 9:45)

- φ Introductions
- φ Review – objectives, plan, participation guidelines

Update – Use of Last Session’s Results and current VCLNA models– Jennifer Ciminelli & Joseph Weber (9:45 - 10:15)

Presentations – Examples of Conservation / Green Infrastructure Projects (10:15 – 12:00)

- Coastal GEMS –Kelly Price DEQ CZM (15 minutes)
- VA Outdoor Plan Green Infrastructure Element – Janit Llewellyn DCR (20 min)
- Wildlife Action Strategy –Kendell Ryan DGIF (20 minutes)
- Hampton Roads Conservation Corridor Study– Eric Walberg HRPDC (30 minutes)

Pizza

Small Group Discussions – How do we facilitate a continued statewide dialog regarding green infrastructure projects? (12:15- 1:15)

- φ Small groups report out and discussion

Wrap Up (1:15- 1:30)

Close
